

Memorial to Frank Cathcart Calkins

1878–1974

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Master mapper, pioneer petrologist, student and mentor of the art of scientific writing, scholar, and connoisseur of music, art, and wine—truly a legend in his own time—Frank Cathcart Calkins became all of these to generations of geologists.

Frank was born in East Rockport, Ohio, on June 7, 1878, a year before the U.S. Geological Survey was established. He was the oldest of five children of Carlos Gilman Calkins and Caroline Cathcart Calkins. His father, a graduate of the Naval Academy, was widely read and was fluent in French and Spanish. He was an author of articles on Naval history and a maker of maps and charts of sea coasts in many parts of the globe. In one of many shifts of duty station, the family moved to Europe when Frank was nine months old. As

a result French became his first language and one for which he maintained a deep and lifelong feeling. In 1895, while his father was in charge of the Hydrographic Office in Portland, Oregon, Frank enrolled at the University of California, there to come under the influence of Joseph LeConte, John C. Merriam, and A. C. Lawson. In the year of his graduation, 1899, Frank began his long career of field studies, accompanying Merriam on a geologic investigation in the John Day basin in eastern Oregon, mainly to collect fossils. Frank, however, collected volcanic rocks, and these, with later additions by Merriam, became the subject of his first paper, published in 1902.

Frank began his remarkable career with the U.S. Geological Survey in 1900, serving as assistant to George Otis Smith, who later became its director. Together they completed studies of the Ellensburg quadrangle, Washington, in 1900, the International Boundary of Washington in 1901, and the Snoqualmie quadrangle in 1902.

Beginning in 1903 in the Coeur d'Alene district, Idaho, Frank initiated the studies of the Precambrian Belt "Series" (as it was then known) that led to establishing the stratigraphic sequence and names of this vast unit. Reports on the Mullen and St. Joe-Clearwater areas in Idaho, and the Philipsburg district in Montana, published from 1908 through 1914, stood for decades as the definitive studies in each of these areas. In 1913 he began the geologic mapping in Yosemite Valley that for the first time demonstrated the internal structure of a part of a great batholith. The resulting maps portrayed details of intrusive relations in a way that eventually became standard, and established a sequence for intrusive events that forty years later was still considered so definitive that it was used as a testing ground for the infant science of K-Ar geochronology.

In 1917 Frank joined B. S. Butler in a study of the ore deposits of the Cottonwood-American Fork area of Utah. He continued the work both underground and on the surface during 1919, 1920, 1921, and in several additional seasons through 1941. Frank's painstaking geologic mapping revealed with clarity the control of replacement

orebodies by the Alta overthrust, the sequence and geologic setting of the intrusive bodies, and the mineralogy of their metamorphic aureoles. An expansion of these studies into adjoining areas, and the petrographic and structural problems associated with them, continued to occupy his attention and to be the subject of field study at elevations of 6,000 to 10,000 ft until he was nearly eighty.

"Master Mapper," to quote James Gilluly, meant that when Frank put a fault or contact on paper you could go to the field and count on finding it. There! His technique was no secret; it was simply to see and describe every outcrop, even if it meant, as it often did in his early years, climbing 5,000 ft before lunch. No simple account, however, can convey an adequate picture of one whose life as an active field geologist spanned the transition from buckboard to helicopter, from pace and compass to aerial photographs, and from an era when granitic rocks were almost automatically interpreted as Precambrian to the era of isotope geochronology.

In the course of studying the Yosemite rocks under the microscope, he found the whole matter of feldspar nomenclature needed tidying up. The resulting paper on plagioclase composition was published in 1917, but how many of us were aware, when we memorized it as undergraduates, that Frank Calkins was largely responsible for the present decimal system of plagioclase notation?

World War II plunged the Survey into a series of strategic mineral studies, whose products Frank and H. G. Ferguson were called upon to edit. This led Frank to an almost separate and all-absorbing career—that of scientific critic and editor. Few indeed were the geologists associated with the Survey in the years from 1935 to 1965 who did not undergo the painful but profitable experience of having a report "Calkinized." His precepts in writing, as in fieldwork, were simple: "I try to put the author's meaning—or what I take to be his meaning—into the clearest and most effective language I can." But seldom has anyone else had the skill, or the perseverance, to redraft sentences, paragraphs, or whole pages if necessary to achieve this end. The results of his penciling, to use Frank's own mild words, "often gave a manuscript a pretty shocking appearance." In truth, many pages were a disaster area that only a skilled and devoted typist could unscramble. To call attention to recurring flaws he used a series of marginal cartoons that Vincent McKelvey aptly dubbed "Calk marks." A top hat signified a pompous phrase or a piece of jargon where plain English would be better; a little balloon pointed out a nebulous or gaseous concept; and +0 meant "this adds nothing, delete." Most long editing efforts led to an "epistle," often ten pages or so, containing a summary of an author's most glaring or persistent faults—and probably some words designed to ease the pain of wounded dignity. In one example he ended: "This experience is going to be like an operation performed without anesthesia. But you need it, and I hope that after recuperation you will feel that the ordeal has been worthwhile."

Repeated exposure to examples of inept writing by scientists who had important things to say finally led Frank to prepare two essays, "Punctuation and Cadence," and "Relative Clauses." The first set forth the principles of construction and punctuation that he regarded as essential elements of style; the second dealt with the perennial problems of "that" and "which." Neither essay was a cookbook containing simple recipes by which a novice could unthinkingly create a literary masterpiece, for Frank instinctively bridled at didactic rules. Instead, they provided insights to intelligent and meaningful placement of words and punctuation in a way that caused emphasis to fall naturally on the important words or phrases—the essence of good cadence.

Frank's last major contribution to the profession was his work on the American Geological Institute's *Glossary of Geology*. He labored for months rewriting, rephrasing,

and repunctuating the entries to be sure each definition was as clear as he could make it. In appreciation, the glossary was dedicated: "To Frank C. Calkins, who by advice and example inspired the editors with his clarity of thought and precision of the written word."

So much for a brief and incomplete account of his career as a geologist. But what kind of *man* was Frank Calkins? He was a perfectionist who found it hard to part with any piece of work or prose. In personal relations he was diffident, even shy. He found it easier to write an "epistle" to a colleague in the same office than to discuss a paper with him personally. Unmarried (he'd chide me for resorting to the "obituary participle"), he found great pleasure in being "Uncle Frank" to the children of a series of fortunate Survey families, bringing to each child a deep and uncritical affection, and through gifts of carefully selected books, an early appreciation of great literature. Possessing a puckish sense of humor, he delighted in creating ingenious verse aimed at bumbling bureaucracy or the foibles of some hapless colleague and sung to the tune of "I Wonder Why" at decades of Pick and Hammer shows. This sample was from the Menlo Park show in 1960:

If you'd produce a manuscript the Upper Brass to please
 I wonder why, I wonder why
 Don't write it in plain English, but in pure Geologese
 I wonder why, I wonder why
 Misuse "reflect" and "postulate" "as well as" and "comprise"
 "Occurs as" and "is present" will delight the regular guys;
 And "penecontemporaneously" will draw admiring cries—
 I wonder why, I wonder why.

The artist in Frank was expressed in a deep and lifelong appreciation of music, particularly when shared with friends. Two "B's" sufficed—Bach and Beethoven—but *not* Brahms, and heaven forbid, not Bartok. Mozart, perhaps, more than any other, possessed the magic that enthralled.

Frank's record of association with the U.S. Geological Survey is itself unique; he had met or worked with all but the first of the Survey's directors and recalled with amusement having employed the youthful W. E. Wrather as assistant packer in 1907 because the position of geologic assistant was already filled. Frank received the Distinguished Service Award from the Department of the Interior in 1948, on reaching the mandatory retirement age of 70, but because of a special dispensation continued working as an annuitant until July 1969—a record of service to the Federal government that spanned 68 years. On finally leaving full time duty, his letter to the chief geologist ends, "I wish I felt more worthy of my unprecedentedly long tenure with an organization that it was an honor even to be admitted to." Ending this final formal communication with an oft-abjured preposition fitted his wry and gentle sense of humor. But the more significant part, in typically self-effacing style, is a poignant message to us all.

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